

Note on the critical review of the study “Life Cycle Assessment for the different used tyres recycling methods” prepared for Aliapur by Ecobilan

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Abstract This note describes the “a posteriori” critical review process of a large Life Cycle Assessment (LCA) study. This LCA study covered nine different recycling options of used tyres. The review was conducted by an international and multipartite seven-member review panel. It should be noted that the preliminary administrative tasks took more time than expected. After that, it took about 4 months from the distribution of the preliminary LCA report to the editing of the final, approved, critical review report. About 140 questions or comments were answered, which contributed to the improvement of the LCA report concerning methodology, data quality and clarity aspects, and to highlighting some research directions.

Keywords Aliapur · Critical review · Ecobilan · End-of-life tyres · Used tyres

1 Introduction

The critical review is an important step in Life Cycle Assessment (LCA) studies according to ISO 14040 and 14044 (ISO 2006a, b). The critical review process is described in the standards in a general way, but few publications deal with the process in detail or give concrete

examples (Klöpffer 1997, 2005, 2009; Fava and Pomper 1997). The ISO standards allow two kinds of critical review:

1. Review by independent expert(s)
2. Review by interested parties (panel method)

The second type of critical review is the more demanding one and requires at least three persons: the chair (appointed by the commissioner of the LCA study) and two or more co-referees. The co-referees may be LCA experts and/or representatives of third parties affected by the results of the study.

The aim of this note is to describe the critical review process of a large LCA study comprising an exceptionally big review panel. The commissioner of the study was the French company Aliapur (Lyon), which is devoted to the collection and recovery of end-of-life tyres. Aliapur has commissioned in 2009 an LCA of different recycling methods (Ecobilan 2009). The practitioner was Ecobilan (Paris), a branch of PriceWaterhouseCoopers (PwC).

2 The critical review panel

Considering that Aliapur intended to have a multipartite critical review and that the study contains comparative assertions intended to be disclosed to the public, the critical review was carried out by a panel of interested parties, according to the requirements of ISO Standard 14044 (ISO 2006b), section 6.1.

This panel was formed of seven reviewers:

- One expert from an environmental NGO: Jacky Bonnemains (Robin des Bois);

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- Three experts specialized in the LCA methodology: Walter Klöpffer (Int J Life Cycle Assess), Lars-Gunnar Lindfors (IVL, Stockholm) and Henri Lecouls, independent;
- Three experts from industries interested in tyres recycling: Didier Laffaire (cement producers), Jean-Sebastien Thomas (steel producers), Guy Castelan (Plastics Europe).

Henri Lecouls has been acting as expert and as chair of the panel. It should be noted that a fourth industrial expert was invited to join the panel but resigned because he would not have sufficient expertise in the area of LCA.

3 Procedure

The preliminary LCA report (dated July 2009) was first written in French, then translated into English and was sent to every reviewer under confidentiality agreement. This preliminary LCA report was accompanied by a short presentation of the critical review of a comparative LCA, written by the chair of the panel for the reviewers. In this presentation, the key steps of a critical review and some examples of questions to be asked were reminded.

It should be noted that the preliminary administrative tasks such as financial and confidentiality agreements, and language translation, took more time than expected. Approximately 2 months after the distribution of the preliminary LCA report, the convener received the provisory critical review contributions from six reviewers (the seventh needed 1 month more). These contributions totalled about 500 questions or comments, from simple editorial remarks to more fundamental ones, many of them were shared by two or three reviewers. The chairman summarized the six (later seven) provisory critical review contributions in a summary of 140 questions or comments (seven pages) and in a short management synthesis (one page) emphasizing on the major and repeatedly made comments. The number of questions and comments reflected the broad scope of the study (nine different recycling options) and the relatively great number of reviewers with different backgrounds.

The chairman sent the one-page synthesis plus the seven pages summary plus a copy of each original contribution (in order to avoid any misunderstanding) to the commissioner Aliapur, to the practitioner Ecobilan and to every reviewer. The commissioner and the practitioner answered in written form to all 140 questions or comments and convened a meeting with the reviewers. Beyond the editorial improvements and the text clarifications that were immediately brought in the LCA report, the discussion concerned essentially a few important comments regarding

either methodology choices or technical and scientific validity of data and results.

4 Meeting and results

The meeting assembled the representatives of commissioner and practitioner and the reviewers and took place at PwC in Paris, October 8, 2009. The discussion was held in French and English in an open and friendly atmosphere.

Catherine Clauzade made clear that Aliapur as quasi-monopolist for tyre recycling in France has a great responsibility and needs a carefully reviewed LCA study which can be presented to the public and can serve as guide for the further development of new recycling options.

The Ecobilan team was led by Philippe Osset, the manager of Ecobilan.¹

Walter Klöpffer invited both commissioner and practitioner to submit a condensed version of the report to Int J Life Cycle Assess (see the paper by Clauzade et al. 2010).

Regarding methodological choices, the reviewers emphasized that destructive recovery alternatives should not be compared with nondestructive alternatives, and that the end-of-life of nondestructive alternatives should be examined, for the simple reason that the material will still be present. It was concluded that destructive and nondestructive recovery alternatives would be presented separately in the LCA report, and that Aliapur would start some research on the end-of-life of nondestructive alternatives.

Another major discussion was about the allocation of feedstock energy embedded in the tyres. In the reviewed study, this energy is totally allocated to the car user and is not accounted for in the recovery processes. On demand of the reviewers, a sensitivity analysis was performed and included in the LCA report: this analysis showed that some nondestructive recovery alternatives are no more “energetically beneficial” when the feedstock energy of tyres is partially allocated to the recycling process.

With regard to the choice of environmental categories and indicators, some reviewers pointed to the lack of toxicology–eco toxicology indicators in the study. This gap was partially filled by introducing in the LCA report some toxicology-oriented studies conducted previously by Aliapur.

Regarding the validity of the data used in this study, the reviewers asked for more justified evaluations of the expected life span of sport grounds: these data were reappraised by the practitioner. The reviewers also pointed out the necessity of a description of the average chemical composition of the tyres: this was done. It was also

¹ Philippe Osset is also a member of the editorial board of this journal.

observed that modelling the use of tyres as a partial substitute of coke in the foundries is somewhat unclear. Knowledge will be improved on this alternative.

After the meeting and some more exchanges by mail, the practitioner sent to the panel members the final edition of the LCA report and the updated answers to the questions and comments. Then the chairman wrote a draft of the final critical review report (five pages) which he submitted for approval to the reviewers within a short deadline. Finally, about 4 months after distributing the preliminary LCA report, the final, approved, critical review report was edited and included in the final LCA report.

5 Concluding remarks

The results of the final LCA study report, now containing the critical review report, were presented to the public in a presentation on February 2, 2010, in Paris. The short paper is included in this issue (Clauzade et al. 2010).

What can we learn from this review, besides how many recycling variants (new and old ones) for tyres exist and are performed or are planned in France?

One point is the preliminary administrative tasks that should not be underestimated. After that, the whole review process took about 4 months. It was essentially a review “a posteriori” (Klöpffer 2005), since the LCA study was nearly finished when the review started. Had we seen an earlier version of the draft report or—better—already the Goal & Scope, we could have influenced the study, and the final phase could have been faster. This is exactly the advantage of the interactive or accompanying review, as recommended in the first LCA Guideline (SETAC 1993). ISO 14040/44 gives no guidance on that respect.

As expected, the LCA report was improved in aspects of methodology, of data quality and of clarity. A prerequisite of a successful critical review is to form a really multipartite panel including industry and LCA methodology expertise and, as much as possible, the point of view of an environmental NGO.

References

- Clauzade C, Osset P, Hugrel C, Chappert A, Durande M, Palluau M (2010) Life cycle assessment of nine recovery methods for end-of-life tyres. *Int J Life Cycle Assess* 15(8). doi:[10.1007/s11367-010-0224-z](https://doi.org/10.1007/s11367-010-0224-z)
- Ecobilan (2009) Analyse du cycle de vie pour neuf voies de valorisation des pneus usagés non réutilisables. (Life cycle assessment for the different used tyres recycling methods). Prepared for Aliapur by Ecobilan
- Fava J, Pomper S (1997) Life-cycle critical review! Does it work? Implementing a critical review process as a key element of the aluminium beverage container LCA. *Int J Life Cycle Assess* 2(3):144–153
- ISO—International Standard Organization (2006a) Environmental management—life cycle assessment—principles and framework. ISO 14040 (October)
- ISO—International Standard Organization (2006b) Environmental management—life cycle assessment—requirements and guidelines. ISO 14044 (October)
- Klöpffer W (1997) Peer (expert) review according to SETAC and ISO 14040. Theory and practice *Int J Life Cycle Assess* 2(4):183–184
- Klöpffer W (2005) The critical review process according to ISO 14040–43: an analysis of the standards and experiences gained in their application. *Int J Life Cycle Assess* 10(2):98–102
- Klöpffer W (2009) Experiences with the critical review process of aluminium LCI data. *Int J Life Cycle Assess* 14(Special Issue 1): 45–51
- Society of Environmental Toxicology and Chemistry (SETAC) (1993) Guidelines for life-cycle assessment: A “Code of Practice”. From the SETAC Workshop held at Sesimbra, Portugal, 31 March to 3 April 1993. Edn. 1, Brussels and Pensacola (Florida), August